

AMATEUR SATELLITE REPORT

AMSAT's Newsletter for the Amateur Space Program.



Amateur Satellite Report is endorsed by the American Radio Relay League as the special interest Newsletter serving the Amateur Radio Satellite Community

Number 122/123

May 8, 1986

Editor: Vern Riportella, WA2LQQ

Contr. Editors:

Eric Rosenberg, WA6YBT

Pete Killingsworth, KD7WZ

Paul Roemer, KG6LC

Managing Editor: Bob Myers, W1XT

Copyright 1986 by Amateur Satellite Report

Project Linkup Phase 2A

Tests Next Weekend

The first in the series of Project Linkup field tests, Phase 2A, will be held Saturday, May 10 at 1245 UTC. The downlink frequency will be 436.550 MHz. The object of Phase 2A tests is to demonstrate linking of terrestrial FM repeaters via gateway stations to AO-10 Mode L. Voice bulletins transmitted during these tests will be especially tailored for beginners and others not presently familiar with satellite jargon. Early tests will use FM via Mode L to provide high-quality audio to the gateway stations for linking to local repeaters.

Phase 3C Mode S also will provide FM service but no Mode JL FM service is planned. Project Linkup officials point out the current Mode L FM experiments on AO-10 are afforded by the unique circumstances of AO-10 and are not to be seen as a general trend towards Mode L FM use. In addition to Mode L FM, Linkup experiments with ACSSB are also planned.

Project Linkup organizers are now actively soliciting Mode L gateway stations and connecting repeaters for the first trial on-the-air bulletin relays. Interested individuals should write to Project Linkup, P.O. Box 177, Warwick, NY 10990. A business sized SASE will speed your reply. Nearly 50 stations have expressed interest to date.

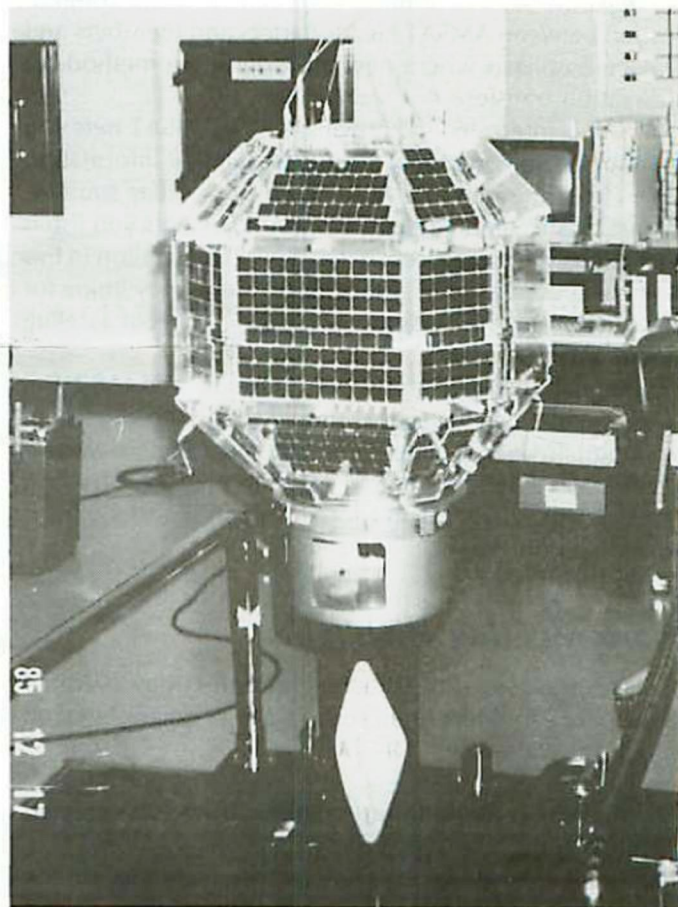
Short Bursts

- An English translation of the new JAS-1 handbook published by JARL will soon be available from Project OSCAR. Details are available for an SASE to Project OSCAR, C/O Ross Forbes, WB6GFJ, P.O. Box 1, Los Altos, CA 94023.
- The Twelfth Annual Eastern VHF/UHF/SHF Conference for Radio Amateurs will be held 16-18 May at Ravier College, South Nashua, NH. Contact Tom Kirby, W1EJ for details: 603-635-2514 or 7514.
- John Gayman, WA3WBU, says he has received his Shuttle Spacelab QSL card from the DARC for the DP0SL operation last year. This indicates the cards are now going out to the successful stations, says John.
- RS-5 and RS-7 have returned to service subsequent to their recent eclipse sequence according to G3IOR. Pat says RS-5 will be on continuously until May 23 and RS-7 will be

on until May 27 when they will encounter a new series of eclipses.

- AMSAT Alternate Director Gordon Hardman, KE3D, recently published an article in "Telecommunications" magazine on the HELAPS amplifier and its commercial applications. HELAPS, High Efficiency Linear Amplification by Parametric Synthesis, is used on AO-10 Mode L. Gordon's article points out the advantages of HELAPS over conventional linear amplifier techniques especially in commercial, mobile satellite applications. Gordon is HELAPS Project Manager at Skylink Corporation of Boulder Colorado.

- Larry Champion, KB4AIH, of Chattanooga has been appointed Area Coordinator for Tennessee. He joins W4AMI



The JAS-1 satellite, with temporary solar cell protective covers of plexiglas, is complete and ready for launch July 31.

in covering the state. Congratulations and thanks to Larry!

- According to John Biro, K1KSY, COSMOS 1686 has a 19.954 MHz beacon. Radio Moscow announced on 04 May that "the crew from MIR is about ready to move from MIR to the SALYUT-7/COSMOS-1686 combination. This should happen on the 5th of May." Previously SALYUT-7 used 142.4175 MHz FM.

Annual Meeting Banquet Grand Prize Announced

Organizers of the 1986 AMSAT Annual Meeting and Fourth Annual Space Symposium have announced two major prizes which will be awarded at the meeting this year. According to Al Brinckerhoff, WB5PMR, ICOM America will donate a new IC-1271A all-mode 1.3 GHz radio as the banquet Grand Prize. Last year ICOM also donated the Grand Prize IC-1271A which was garnered by Art Feller, KB4ZJ. The 1986 Grand Prize will be awarded at the banquet on November 8 at the Dallas/Fort Worth Hilton.

A pre-registration prize has been donated by Alinco. It is a 100 watt 70 cm amplifier. The amplifier, the IC1271A together with more than a dozen additional prizes, will be awarded this year.

Net Survey Offers Free Premium

An assessment of AMSAT net effectiveness has been undertaken. The survey will run throughout this month of May. The objective is to determine ways of improving communication between AMSAT Headquarters and members and to place emphasis where needed to improve methods of information transfer.

AMSAT is interested in knowing which AMSAT nets you listen to and how much of your total satellite information comes from the nets and how much from other sources. To participate, send a report of the AMSAT nets you listen to including the most recent dates. Your participation in this survey will be rewarded with a handy frequency guide for Phase 3C and JAS-1 suitable for hanging on your satellite operating position.

To receive this special AMSAT Phase 3C and JAS-1 frequency guide for your shack, simply send your net listening report including dates you listened together with a business sized SASE to AMSAT Net Survey, P.O. Box 177, Warwick, NY 10990. Don't forget the SASE. This offer is good only until May 30, 1986.

Board Meeting Highlights

The AMSAT Board of Directors met on Friday evening, April 25, for a mid-term mini-session. Major decisions taken include the following:

- Ralph Wallio, WØRPK, of Indianola, Iowa, was elected Vice President for Operations
- A fund will be established to purchase insurance on the Phase 3C satellite for launch hazards
- *Amateur Satellite Journal* has been suspended. Subject

to further approval, ASJ will be replaced by ASR and an optional magazine jointly published with a major domestic concern

- The Annual Meeting and Space Symposium will be held at the Dallas/Fort Worth Hilton the weekend of November 7-9

New Satellite Equipment Debuts at Dayton; More to Follow

Owners of the Yaesu FT-726R take note! The long-heralded 23 cm transmit module for this popular radio is on the way. This according to Yaesu Vice President Chip Margelli, K7JA, at this year's Dayton Hamvention. Chip says the 8 to 10 watt unit suitable for Mode L will be mast-mounted. ASR guesses it will be fed at an i-f frequency, perhaps 2 meters, to avoid prohibitive transmission line losses at 1.3 GHz. The unit will be available in the U.S. in 90 to 120 days says Margelli. No price was disclosed for the unit.

The ICOM IC-1271A is being imported to the U.S. in higher numbers than ever. Many dealers are now receiving the units for sale. The IC-1271A is an all-mode, 1240-1300 MHz transceiver which produces 10 watts and is another Mode L-compatible rig.

Encomm, Inc. of Dallas showed an advanced prototype of its auto-tracking system. Using a Ken-Pro KR5600 and



Everett Gracey, WA6CBA, left, presents Al Brinckerhoff, WB5PMR, with a 70 cm, 100 watt amplifier for the pre-registration prize for the 4th Space Symposium and Annual Meeting in Dallas this November.

a modified version of the W0SL tracking program together with a proprietary analog to digital converter, the unit will be available soon according to Tom Gentry, K5VOU, En-comm President.

Telex-HyGain introduced its new OSCAR antennas. The 216S is a 16 element (eight in each plane) 2 meter crossed yagi on a 170 inch boom. Gain is claimed at 11.5 dBd, a reasonable value for this design. Logarithmic element spacing is used to reduce sidelobes. The 215S is a 30 element (15 in each plane) 70 cm crossed yagi on a 122 inch boom based on NBS Tech Note 688 for a 4.2 lambda boom. Gain is claimed at 14 dBd, also a reasonable number. Both antennas have polarization sense switching (left hand to right hand) in an encapsulated relay. HyGain says the "true rf switching relays are rated at 200 watts." We wondered what would happen to that rating when an ice coating or fog changed antenna feed VSWR and increased the voltage across the miniature relay. The two new antennas can be obtained in a package similar to the Cushcraft offering. The package is designated the 218S OSCAR system. In addition to the two antennas, the package also includes a fiberglass cross boom to reduce pattern degradation.

AEA has a new packet radio box out which does for any computer what the PK-64 does for the C-64 computer; make it a Terminal Node Controller.

Downeast Microwave is serious about loop yagis. Bill Olson, W3HQT, brought dozens with him and brought back only a few. His design seems a successful one which is



Evelyn Garrison, KA7LPK, Marketing Manager of ICOM, points out a feature of a new product. ICOM has donated a new IC-1271A for AMSAT's Annual Meeting banquet grand prize. (November 8 in Dallas)



The AMSAT booth featured an L5 Society representative (left). Seated next to her is K9PVW. Standing are WD9IIC, WA3GOV and W5DID to extreme right.

bound to fill a niche in equipment requirements for the new Mode JL on Phase 3C.

News at the Lunar booth has Tet antennas now being manufactured in the U.S. and Mike Stahl, K6MYJ, teaming up with Lunar on future projects. Mike was formerly with KLM and designed the popular 14C, 16C, 18C, 22C and 40CX series of OSCAR antennas among others.

Dayton Hamvention Matches Prior High Mark

AMSAT's participation in the Dayton Hamvention this year matched a previous high mark in terms of member renewals and new members. Nearly 150 new members and renewals signed up at the AMSAT booth.

Forums on all three days played to highly enthusiastic audiences with occasional standing-room only crowds.

AMSAT's new ballcaps with insignia proved a hit and were nearly completely sold out. They will be re-ordered, however, and featured in AMSAT's new trinket catalog being developed by Dick Beers, WD9IIC.

In sum, the 1986 Hamvention was a complete success with much of the credit going to a fine booth crew under the leadership of Mike Crisler, N4IFD. AMSAT is very proud of the fine job done by all who helped in the booths and by speaking at the excellent forums!

Level 2 ACSSB Test Station Ready

Ed Nowak, W1FAJ, of Farmington, CT, has announced he has completed a level 2 ACSSB AO-10 Mode B station. The equipment is based on surplus Sideband Technology Inc. ACSSB equipment Ed obtained last year from ARRL as part of Project Companion. He is looking for other comparably equipped station to meet on AO-10 Mode B for testing this new equipment and techniques. In an article in the ARRL's advanced experimenter's magazine *QEX*, number 49 for April, 1986, Paul Rinaldo, W4RI, describes progress in ACSSB and in Project Companion.

Tentative Future AO-10 Schedule Previewed

The current AO-10 operating schedule is:

Mode B	033 thru 044
Mode L	045 thru 062
Mode B	063 thru 189
OFF	190 thru 032

The current attitude is Bahn longitude 140 and latitude 0. AO-10 Command Station Ian Ashley, ZL1AOX, has previewed a possible schedule for later this spring. On about 20 May, the next series of maneuvers will begin. At that time the attitude will be shifted towards 185, -5, and the transponder schedules will be adjusted so Mode L occurs centered at apogee, MA 128.

For longer term planning, command stations are now discussing a tentative schedule for late spring to mid-summer. Here is the proposed OSCAR 10 transponder schedule for about 20 May to 15 August 1986.

Mode B	050 thru 119
Mode L	120 thru 136
Mode B	137 thru 199
OFF	200 thru 219
Mode B	220 thru 244
OFF	245 thru 049

As sun angles and eclipse times change, there may be minor changes in the transponder schedules. During this period of attitude changes and consequent transponder operating schedule changes, it is especially helpful to check the CW and RTTY bulletins as well as the PSK "M" blocks on the satellite beacon frequencies of 145.810 and 436.040 MHz.

Phase 3C Progress Report

A compilation of reports #9, 10 and 11

by Joe Flaska, WBØRLY AMSAT Colorado Area Coordinator

AMSAT DL reports work on the transponders continues satisfactorily. The Power Amplifier and Modulators are apparently done and the RUDAK module has been on the air locally.

The kick motor mounts are complete and are being held for installation once Phase 3C arrives in Marburg after com-



Keith Pugh, W5YI, describes his new Mode L dish at Dayton.

pletion in Colorado. This also means the kick motor will be installed there and the shake test will likewise be done by AMSAT DL.

Although our AMSAT DL colleagues play a significant role in P3C, communications between our groups often suffers because of language differences and a lack of means for rapid communication. Hopefully, this will be addressed when the DL team arrives here in May.

The Liquid Ignition Unit problem is partially solved but additional work remains. The Propellant Flow Assembly has been received from Dick Daniels, W4PUJ, and a test fit is scheduled for 4 May. The Helium Bottle tubing now has a connector welded to it. The Helium Bottle and its mounting bracket have been painted and were shipped to Boulder several days ago.

The final semi-rigid coax lines were installed by KØKE and the 2 meter antennas were cut from stock material. Gold



Newly elected VP-Ops, Ralph Wallio, WØRPK, (foreground) listens to a presenter at Dayton.

plating of the antenna elements is to be done this week. Mounts for the antennas are to be machined shortly.

KØRZ, Bill McCaa, confirms the N6CA Power Amplifier has been received and delivered to KYØS, Charlie Hill, of Colorado Springs for integration into the Mode S rf Module. Bill also reports that KØKE, Eric, has agreed to complete the flight unit i-f and control board for the Mode S transponder originally designed by KE3D, Gordon. The i-f board is presently the item pacing completion of the transponder for thermal vacuum testing.

Robert L. Staehle, President of the World Space Foundation, and his brother, Allen, were our guests at the AMSAT Lab on 26 April. Bob's special interest in the progress of Phase 3C was apparent and we hope his tour was fruitful. His group is developing the Solar Sail project and they hope for a launch from a future Shuttle mission.

Antennas are being collected for use during the Thermal-Vacuum test at Martin-Marietta now tentatively scheduled for 26 May.

Latest P3C frequency information from DJ5KQ, Werner Haas is as follows:

Mode B:

Passband 150kHz

Uplink passband center: 435.500 MHz

Downlink passband center: 145.900 MHz

Mode L:

Passband 250 kHz

Uplink passband center: 1269.450 MHz

Downlink passband center: 435.850 MHz

Mode J:

Passband 40 kHz

Uplink passband center: 145.840 or 144.46 MHz
(command controllable)

Downlink passband center: 435.950 MHz

RUDAK: (single frequency)

Uplink frequency: 1269.675 MHz

Downlink frequency: 435.675 MHz

Phase 3C Status Report #12, 4 May, 1986

by Joe Flaska, Colorado Area Coordinator

Jan King, W3GEY, held a "final push" planning meeting covering must-do tasks to be done in these last 4 weeks before Thermal-Vac testing. Seventeen hardy souls were on hand and specific projects were assigned to each. They range from the highly technical to paper flow routines.

Dick Daniels, W4PUJ, was with us for the weekend. On 3 May he installed the propellant flow assembly. This highly complex unit will handle the flow of fuels to the on-board kick motor. Today, he completed installation of the Helium Bottle and its attached pressure line. Test mounting of the Separation Spring Push Pads occurred and all was found nominal. Some soldering of wires below the fuel tank and in the arms remains to be done.

Tests were made on the finely machined 2 meter antenna mounting parts and all was found satisfactory. The antennas are scheduled to be delivered this coming week.

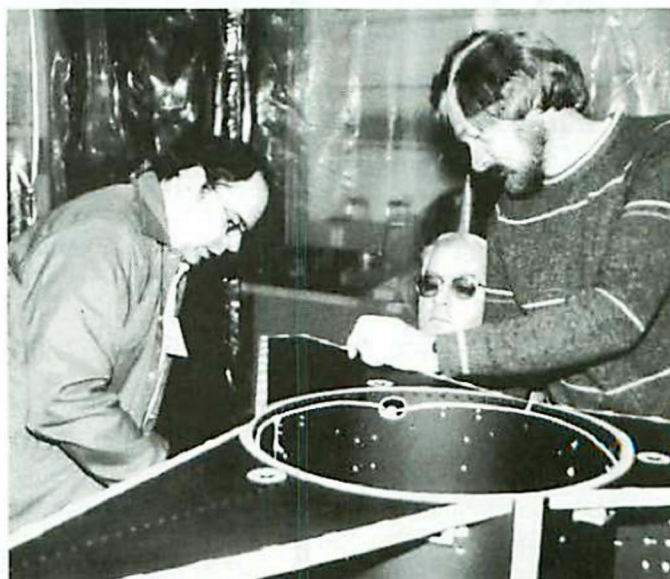
Except for a few small items, the structure is ready for mounting of transponders.

Thermal Vacuum testing has slipped to 26 May because the chamber will not be ready until that date. On 3 May coverage tests from the top of the building housing the chamber were conducted by WDØHHU, Dave, and AAØP, Jack. They used omni-directional antennas and their signal was clearly heard in most parts of the Metro Denver area. The test was sanctioned by Martin-Marietta officials and clearance to radiate from the facility appears all but cast in stone.

We're presently looking for 1.2 GHz, 435MHz and 2 meter gear for use during the Thermal-Vac test period for telemetry monitoring and control purposes. Any offers would be considered.

Mode S progress continues albeit slowly. The N6CA final amplifier has been integrated into the RF module by KYØS, Charlie. The final build of the i-f and control board for this transponder is being done by KØKE, Eric. Much remains to be done according to KØRZ, Bill McCaa.

The first AMSAT DL contingent is expected in Denver on 10 May. Accommodations are being arranged for them and



Seen working on P3C are, left to right, Bill McCaa, KØRZ; Hal Herbert, W8FAR; Keith Ericson, KØKE.

others who will follow at weekly intervals. A Command Station meeting is tentatively set for 26 May and all Command Station personnel are expected.

The Public Broadcasting System film crew is scheduled to be at the lab on 18 May. Airing of their Phase 3C coverage is expected in the fall.

A tour of the lab and a look at Phase 3C was afforded local hams on 3 May. That is the final group tour scheduled.

Telemetry from Phase 3C must be continuously monitored during Thermal-Vac. Anyone interested in helping should contact W3GEY, Jan King.

World Exposition Open in Vancouver

According to AMSAT British Columbia Area Coordinator Tony Craig, VE7XQ, the World's Fair "Expo 86" will feature multiple amateur radio station operation including satellites. The exposition opened in Vancouver on May 2

and runs through October 13. Tony says to listen for VE7EXPO on all bands from 1.8 MHz through 1.2 GHz. The station will be operated 12 hours per day, 7 days per week for the entire period of the exposition! A full satellite station will be in operation. All are invited to come and operate the station from the Canada Pavilion. For further details, please contact Tony, VE7XQ, directly at his Vancouver residence.

ISKRA-4 To Have Modes A and J

The ISKRA-4 satellite planned for deployment soon from the Russian Mir Space Station will have both Mode A and Mode J transponders aboard according to Nico Jansson, PAØDLO. Nico attributes this information to Leo Labutin, UA3CR. The presence of these two transponders is a surprise in several senses. The complexity of two transponders aboard a single spacecraft has not been attempted before by the Russians although it is anticipated that the soon-to-be-launched RS-9 and RS-10 will carry at least two transponders each. What makes the A/J news on ISKRA-4 more significant is that it is a very small spacecraft suitable for manual deployment by the Cosmonauts.

U.S. Launch Program Staggers Under Third Consecutive Failure

Another major failure has struck the U.S. space launch program. Following the Challenger Shuttle disaster January 28, a major USAF launch blew up at Vandenberg AFB, California 18 April. Now another failure has claimed the highly reliable Delta program dooming a GOES weather satellite.

The Delta 3914 carrying GOES-7 failed 3 May about 71 seconds after launch. Apparently the main (liquid) engine in the first stage suddenly shut down ("almost as though it had been commanded", according to NASA). Since the vernier engines had been lost as well, only the 9 non-steerable solids were left, so the launcher had no attitude control capability. It then began to yaw to the right and when the angle of attack became too great, the payload fairing (and presumably the payload) were ripped off the vehicle. The launcher itself, with the solids still burning, continued to tumble end-over-end until range safety destroyed it about 20 seconds after the shutdown.

With the indefinite suspension of further Delta launches the U.S. space program is devastated; at the nadir of its history.

W6CG Is A Silent Key

Bud Schultz, W6CG, passed away Thursday afternoon, 24 April. He had been in declining health in recent years. The apparent cause of death was a heart attack. The end came quickly. He was convalescing at home following surgery to correct a persistent condition.

Bud had been active in OSCAR satellites and AMSAT since October, 1973 when he made his first contact on AMSAT OSCAR 6. He later became a ground command sta-

tion for both AO-6 and AO-8. When interviewed for an ASR feature article in 1981, he had already amassed over 7000 OSCAR contacts.

He was well-known on many bands for years. He first held the call 9CSB and later W9CF when he was an engineering student at the University of Chicago. His working career was spent in broadcasting at station WGN and later with the Mutual Broadcasting System.

Bud was AMSAT Life Member #100 and held numerous awards for operations including DXCC, WAZ, and OSCAR WAS #5. His AO-7 Mode A contact with G3IOR stood for years as an all-time satellite DX record although it has since been topped on the RS birds.

In recent years Bud had devoted his talent to information dissemination on the AMSAT South Pacific Information Net where he held forth with his gravel-tone voice on 10 meters and later on 15 for several years. Declining health and poor propagation on 10 and 15 meters forced his retirement from this net two years ago.

About a year ago Bud received a Special AMSAT Achievement Award presented by Dennis Dinga, N6DD, on behalf of all whom he had served so well for so long. Bud commented that among his many awards, that award was the one of which he was most proud.

Bud Schultz, W6CG, the old Dutchman and for years a pillar in AMSAT doings is gone. He will be missed by all.

Poor Satellite Prospects For Field Day

AO-10 Command station Ian Ashley, ZL1AOX, reports the satellite will be not be in good position for the ARRL Field Day this June 28 and 29. The satellite will be in view only during perigee and Ian reports chances are poor it can be turned on during the perigee passage because of eclipses and poor sun angles during that period.

Plan on using RS-5 or RS-7 if they are available for Field Day satellite bonus points. There is a chance RS-9 and RS-10 will be launched and in operation by late June. Both are expected to include Mode A and perhaps Mode K transponders. It is unknown if these spacecraft will contain Mode B transponders. Sources indicate this is doubtful, however.

MARCE Telemetry Stations, Statistics Announced

The highly successful Marshall Amateur Radio Experiment, MARCE, was carried aboard the Shuttle Columbia 12 January 86. The six day science mission was hailed as significant with the surprise announcement by Ed Stluka, W4QAU, in March that at least one station, KG6DX, had successfully captured the MARCE downlink FM telemetry as relayed by AO-10. (See ASR 120/121)

According to W4QAU, Ed Stluka a total of 31 ground stations participated in the telemetry capture. They are: CE3BCF, CE3KB, CE3XK, F1CDC, JA2BGX, JA2GSD, JA2NCF, JA3CF, JA3XJK, JA8PL, JE3MXU, JH1RNZ, JH2DCW, JH7CKF, JI1VYH, JR1RBR, KD7XG, KG6DX, NF6S, PY2BJO, VK5AGR, WA5NOM, WH6AMX, ZD8LM, ZL1AOX, ZL1PK, ZL1TEE, ZL1UNI, ZS6AKV, ZS6BMN, 5Z4EG, 5Z4RG.



Mike Crisler, N4IFD, makes a point at the popular Beginner's Forum.

Other interesting statistics on MARCE are provided by W4QAU.

STS-61C, GAS007, Project Explorer
Marshall Amateur Radio Club Experiment (MARCE)
Flight Data Report — Ground Stations Summary

Number of Ground Stations			Direct Downlink Voice Message		
Place	Number	%	Place	# of Messages	%
Japan	15	47	Japan	214	44
All Others	16	53	Guam	70	14.4
Total	31		Hawaii	9	1.8
AO-10 Ground Stations			Brazil	44	9.1
Place	Number		New Zealand	17	3.5
USA	3		France	5	1.0
Guam	1		S. Africa	14	2.9
New Zealand	1		Australia	7	1.4
	5		Ascension Island	45	9.2
			Kenya	9	1.8
			Chile	51	10.5
				485	

Publications Overhaul Is Proceeding Apace

AMSAT President WA2LQQ reports the overhaul of AMSAT publications interests are proceeding well. The plans now being formulated affect two present publications and two future ones as well.

A letter was mailed April 10th to all AMSAT members explaining the details of a plan which would provide a bi-weekly newsletter to all members and offer an optional monthly technical magazine.

Several new editors have been added to AMSAT's all-volunteer editorial staff recently. They include Eric Rosenberg, WA6YBT, Pete Killingsworth, KD7WZ and Paul Roemer, KG6LC. In addition, Ron Long, W8GUS, and Tom

Forrest, N4GVK, have been named to AMSAT's publications staff. Eric works at the Public Broadcasting station in Harrisburg, PA. Pete is clinical chemist at a Washington hospital. Paul is a consultant in aerospace systems. Ron is professor of Electrical Engineering at Ohio State University. Tom is a journalist and photographer at a daily newspaper in North Carolina.

In addition, Bob Diersing, N5AHD, has been named Editor of the *AMSAT Technical Journal*, an engineering-level document planned for publication by year's end.

A special publication, *The AMSAT-OSCAR 25th Anniversary Yearbook*, is in planning and will be published to coincide with the AMSAT Annual Meeting and Fourth Annual Space Symposium planned for Dallas, Texas this November.



QST Editor Paul Rinaldo, W4RI spoke about ACCSSB at a Dayton AMSAT forum.

Mode L Experiments Commence

A series of AO-10 Mode L experiments commenced the weekend of April 5-6. These experiments will lead to Mode L bulletin service using ACCSSB and FM on an experimental basis. The Mode L experimental station at WA2LQQ is especially configured for these tests including ACCSSB and FM emissions. Initial results were favorable. The signal-to-noise ratio observed varied between 15 and 17 dB. The first trial bulletin transmission using FM was received with nearly "full-quieting" by KØRZ.

AO-10 Mode L may in the future be used to transmit bulletins through gateway stations to terrestrial FM repeaters for local consumption. There are no plans to use Phase 3C, Mode JL for this function. Spectrum and power demands on Phase 3C Mode JL will probably rule out FM use. However, Mode S FM bulletins are a possibility and are being studied.

Equipment for Level 1 ACCSSB transmissions using equipment designed and built by Project OSCAR President Jim Eagleson, WB6JNN, is in the process of system integration. Level 2 ACCSSB using surplus Sideband Technology Inc equipment is some months away according to WA2LQQ. Project Linkup organizers are now actively soliciting Mode L gateway stations and connecting repeaters for the first trial on-the-air bulletin relays tentatively slated for May. Interested individuals should write to Project Linkup, P.O. Box 177, Warwick, NY 10990. A business sized SASE will speed your reply.

Orbit Predictions

By WA2LQQ & KA9Q

Satellite	OSCAR-9
Catalog number	12888
Epoch time:	86115.47650329
Fri Apr 25 11:26:09.884 1986 UTC	
Element set:	881
Inclination:	97.6535 deg
RA of node:	115.9875 deg
Eccentricity:	0.0001006
Arg of perigee:	227.3753 deg
Mean anomaly:	132.7393 deg
Mean motion:	15.28330946 rev/day
Decay rate:	1.524e-05 rev/day ²
Epoch rev:	25291
Semi major axis	6855.903 km
Anom period:	94.220431 min
Apogee:	489.821 km
Perigee:	488.441 km
Ref perigee:	3036.45237761
Fri Apr 25 10:51:25.425 1986 UTC	
Beacon:	145.8250 MHz

Satellite	OSCAR-10
Catalog number	14129
Epoch time:	86117.76263104
Sun Apr 27 18:18:11.321 1986 UTC	
Element set:	240
Inclination:	26.4415 deg
RA of node:	82.9233 deg
Eccentricity:	0.6015207
Arg of perigee:	105.9655 deg
Mean anomaly:	324.7968 deg
Mean motion:	2.05853748 rev/day
Decay rate:	-3.8e-07 rev/day ²
Epoch rev:	2660
Semi major axis	26105.676 km
Anom period:	699.525762 min
Apogee:	35434.555 km
Perigee:	4028.346 km
Ref perigee:	3038.81013402
Sun Apr 27 19:26:35.579 1986 UTC	
Translate freq	581.0047 MHz
Invert:	1
Beacon:	145.8100 MHz

Satellite	OSCAR-11
Catalog number	14781
Epoch time:	86101.59190937
Fri Apr 11 14:12:20.969 1986 UTC	
Element set:	132
Inclination:	98.1565 deg
RA of node:	169.4743 deg
Eccentricity:	0.0143980
Arg of perigee:	16.0828 deg
Mean anomaly:	344.0823 deg
Mean motion:	14.62040556 rev/day
Decay rate:	6.7e-07 rev/day ²
Epoch rev:	11263
Semi major axis	7061.805 km
Anom period:	98.492480 min
Apogee:	786.944 km
Perigee:	583.592 km
Ref perigee:	3022.59493362
Fri Apr 11 14:16:42.265 1986 UTC	
Beacon:	145.8260 MHz

Satellite	RS-5
Catalog number	12999
Epoch time:	86114.01414659
Thu Apr 24 00:20:22.265 1986 UTC	
Element set:	315
Inclination:	82.9655 deg
RA of node:	136.1006 deg
Eccentricity:	0.0012011
Arg of perigee:	147.2915 deg
Mean anomaly:	212.9062 deg
Mean motion:	12.05054534 rev/day
Decay rate:	4e-08 rev/day ²
Epoch rev:	19134
Semi major axis	8033.835 km
Anom period:	119.496667 min
Apogee:	1671.490 km
Perigee:	1652.191 km
Ref perigee:	3035.04805326
Thu Apr 24 01:09:11.801 1986 UTC	

Satellite	RS-7
Catalog number	13001
Epoch time:	86111.47652280
Mon Apr 21 11:26:11.569 1986 UTC	
Element set:	248
Inclination:	82.9635 deg
RA of node:	131.3184 deg
Eccentricity:	0.0023616
Arg of perigee:	79.9498 deg
Mean anomaly:	280.4231 deg
Mean motion:	12.08698440 rev/day
Decay rate:	4e-08 rev/day ²
Epoch rev:	19161
Semi major axis	8017.669 km
Anom period:	119.136416 min
Apogee:	1678.881 km
Perigee:	1641.012 km
Ref perigee:	3032.49481081
Mon Apr 21 11:52:31.654 1986 UTC	

Satellite	NOAA-9
Catalog number	15427
Epoch time:	86111.24612296
Mon Apr 21 05:54:25.23 1986 UTC	
Element set:	84
Inclination:	98.9923 deg
RA of node:	69.7683 deg
Eccentricity:	0.0015042
Arg of perigee:	317.0800 deg
Mean anomaly:	42.9201 deg
Mean motion:	14.11420476 rev/day
Decay rate:	-7.8e-07 rev/day ²
Epoch rev:	6981
Semi major axis	7229.835 km
Anom period:	102.024877 min
Apogee:	872.240 km
Perigee:	850.490 km
Ref perigee:	3032.23767597
Mon Apr 21 05:42:15.204 1986 UTC	
Beacon:	137.5000 MHz

Satellite	mir
Catalog number	16609
Epoch time:	86120.93409930
Wed Apr 30 22:25:06.179 1986 UTC	
Element set:	112
Inclination:	51.6210 deg
RA of node:	119.3083 deg
Eccentricity:	0.0007850
Arg of perigee:	92.1272 deg
Mean anomaly:	268.0776 deg
Mean motion:	15.76599944 rev/day
Decay rate:	0.0001739 rev/day ²
Epoch rev:	1106
Semi major axis	6718.736 km
Anom period:	91.335789 min
Apogee:	358.989 km
Perigee:	348.441 km
Ref perigee:	3041.95029491
Wed Apr 30 22:48:25.480 1986 UTC	
Beacon:	143.6250 MHz

Satellite	Salyut-7
Catalog number	13138
Epoch time:	86120.92846185
Wed Apr 30 22:16:59.103 1986 UTC	
Element set:	148
Inclination:	51.6240 deg
RA of node:	119.2715 deg
Eccentricity:	0.0005778
Arg of perigee:	98.7760 deg
Mean anomaly:	261.2660 deg
Mean motion:	15.76829195 rev/day
Decay rate:	0.00010277 rev/day ²
Epoch rev:	23230
Semi major axis	6718.084 km
Anom period:	91.322510 min
Apogee:	356.658 km
Perigee:	348.894 km
Ref perigee:	3041.94585505
Wed Apr 30 22:42:01.876 1986 UTC	

Reference Orbits

Sunday May 11, 1986

OSCAR-9
Sun May 11 01:24:37.932 1986 UTC:
Ascending node at 117.7w
Nodal period: 94.27779 min
Longitude increment:
23.566640 deg w/orbit
Element set 881, epoch:
Fri Apr 25 11:26:09.884 1986 UTC

OSCAR-11
Sun May 11 00:28:49.904 1986 UTC:
Ascending node at 37.2w
Nodal period: 98.55046 min
Longitude increment:
24.637426 deg w/orbit
Element set 132, epoch:
Fri Apr 11 14:12:20.969 1986 UTC

RS-5
Sun May 11 00:48:47.343 1986 UTC:
Ascending node at 113.9w
Nodal period: 119.55324 min
Longitude increment:
30.015246 deg w/orbit
Element set 315, epoch:
Thu Apr 24 00:20:22.265 1986 UTC

RS-7
Sun May 11 00:15:42.619 1986 UTC:
Ascending node at 111.8w
Nodal period: 119.19279 min
Longitude increment:
29.925081 deg w/orbit
Element set 248, epoch:
Mon Apr 21 11:26:11.569 1986 UTC

NOAA-9
Sun May 11 00:35:09.270 1986 UTC:
Ascending node at 147.7w
Nodal period: 102.08169 min
Longitude increment:
25.519223 deg w/orbit
Element set 84, epoch:
Mon Apr 21 05:54:25.23 1986 UTC

Mir
Sun May 11 00:16:01.152 1986 UTC:
Ascending node at 165.2w
Nodal period: 91.25330 min
Longitude increment:
23.202663 deg w/orbit
Element set 112, epoch:
Wed Apr 30 22:25:06.179 1986 UTC

Salyut-7
Sun May 11 00:06:29.318 1986 UTC:
Ascending node at 162.8w
Nodal period: 91.24843 min
Longitude increment:
23.201513 deg w/orbit
Element set 148, epoch:
Wed Apr 30 22:16:59.103 1986 UTC

AO-10 Apogees

The first apogee of each UTC day with SSP.

Day	Date	Time	Latitude	Longitude	Arg.Per.
Sun	11May	04:03:30	24.8s	277.1w	109.7
Mon	12May	03:22:40	24.8s	267.7w	110.0
Tue	13May	02:41:43	24.7s	258.3w	110.2
Wed	14May	02:00:47	24.7s	248.9w	110.5
Thu	15May	01:19:50	24.6s	239.5w	110.7
Fri	16May	00:38:54	24.6s	230.1w	111.0
Sat	17May	11:37:30	24.5s	36.0w	111.3

Amateur Satellite Report is published and mailed First Class bi-weekly by the Radio Amateur Satellite Corporation. The purpose is to enhance communications about the Amateur Radio Satellite Program. Subscription rates for the United States, Canada, and Mexico are \$22.00; Foreign is \$30.00. The rate covers 26 issues (typically one year). Send check or money order in U.S. funds (drawn on U.S. banks only please) to "Satellite Report," 221 Long Swamp Road, Wolcott, CT 06716. Information contained herein may be quoted without permission provided credit is given to Amateur Satellite Report, Wolcott, CT 06716. Amateur Satellite Report is Copyright Protected and duplication of this publication in any way including by the photocopy process or by electronic means (computer data banks, etc.) is not permitted under any circumstances. Amateur Satellite Report is endorsed by the ARRL as the special interest newsletter serving the Amateur Radio Satellite Community. The editorial opinions expressed are not necessarily those of the ARRL.